I claim:

1. A method of filtering an input data stream D_{in} with a digital filter that defines a quantized impulse response to thereby generate filtered output signals of a filtered output data stream D_{out} wherein said input data stream D_{in} has data samples that occur at a system rate F_s, the method comprising the steps of:

converting successive strings of M successive data elements in said input data stream D_{in} to M parallel data elements that respectively occur at a substream rate F_s/M in M data substreams D_{sbstrm}; and

at said substream rate F_s/M, generating M convolutions of said quantized impulse response with said M data substreams wherein each of said convolutions is arranged to generate a different one of M successive filtered output signals.

2. The method of claim 1, wherein said converting step includes the steps of:

delaying said input data stream D_{in} by at least one delay of $1/F_s$ to generate at least one delayed version of said input data stream D_{in}; and

at said substream rate F_s/M, providing corresponding data elements of said input data stream D_{in} and said delayed version.

3. The method of claim 2, wherein said delaying step includes the step of passing said input data stream D_{in} through at least one data register.

4. The method of claim 2, wherein said providing step includes the step of latching said data elements at said substream rate F_s/M.

5. The method of claim 1, wherein said convolution generating step includes the steps of:

at said substream rate F_s/M, performing the steps of:

a) delaying each of said M parallel data elements with

delays of M/F_S to generate a plurality of respective delayed data elements;

b) multiplying said delayed data elements and at least one selected parallel data element by selected coefficients of said quantized impulse response;

and

c) summing products generated in said multiplying step;

in said multiplying step, choosing said selected parallel data element and said selected coefficients to generate one of said M successive filtered output signals;

and

executing M variants of said performing and choosing steps to generate all of said M successive filtered output signals.

6. The method of claim 1, wherein said convolution generating step includes the steps of:

at said substream rate F_S/M, delaying each of said M parallel data elements with delays of M/F_S to generate a plurality of respective delayed data elements;

at said substream rate F_S/M, performing the steps of:

a) multiplying said delayed data elements and at least one selected parallel data element by selected coefficients of said quantized impulse response;

and

b) summing products generated in said multiplying step;

in said multiplying step, choosing said selected parallel data element and said selected coefficients to generate one of said M successive filtered output signals;

and

executing M variants of said performing and choosing steps to generate all of said M successive filtered output signals.

7. The method of claim 1, further including the step of selecting, at said system rate F_S, said M filtered output signals in successive order to thereby form said filtered output data stream D_{out}.

8. The method of claim 1, wherein said selecting step includes the step of multiplexing said M successive filtered output signals.

9. The method of claim 1, wherein M is two.

10. The method of claim 1, wherein M is at least three.

11. A digital filter that has a quantized impulse response and that filters an input data stream D_{in} to thereby generate filtered output signals of a filtered output data stream D_{out} wherein said input data stream D_{in} has data samples that occur at a system rate F_s, the filter comprising;

a converter that converts successive strings of M successive data elements in said input data stream D_{in} to M parallel data elements that respectively occur at a substream rate F_s/M in M data substreams D_{sbstrm}; and

a data processor that performs the step of generating, at said substream rate F_s/M, M convolutions of said quantized impulse response with said M data substreams wherein each of said convolutions is arranged to generate a different one of M successive filtered output signals.

12. The filter of claim 11, wherein said converter is an M-stage buffer store.

13. The filter of claim 11, wherein said converter includes:

at least one register that realizes at least one delay of 1/Fs to generate at least one delayed version of said input data stream D_{in}; and

latches that provide corresponding data elements of said input data stream D_{in} and said delayed version.

14. The filter of claim 11, wherein said convolution generating step includes the steps of:

at said substream rate F_s/M, performing the steps of:

a) delaying each of said M parallel data elements with

delays of M/F_S to generate a plurality of delayed data elements;

b) multiplying a selected one of said parallel data elements and said delayed data elements by selected coefficients of said quantized impulse response; and

c) summing products generated in said multiplying step;

choosing said selected parallel data element and said selected coefficients to generate one of said M filtered output signals; and

executing M variants of said performing and said choosing steps to generate all of said M filtered output signals.

15. The filter of claim 11, wherein said convolution generating step includes the steps of:

at said substream rate F_S/M, delaying each of said M parallel data elements with delays of M/F_S to generate a plurality of respective delayed data elements;

at said substream rate F_S/M, performing the steps of:

a) multiplying said delayed data elements and at least one selected parallel data element by selected coefficients of said quantized impulse response; and

b) summing products generated in said multiplying step;

in said multiplying step, choosing said selected parallel data element and said selected coefficients to generate one of said M successive filtered output signals; and

executing M variants of said performing and choosing steps to generate all of said M successive filtered output signals.

16. The filter of claim 11, further including a multiplexer that selects, at said system rate F_S, said M filtered output signals in successive order to thereby form said filtered output data stream D_{out}.

17. The filter of claim 11, wherein M is two.

18. The filter of claim 11, wherein M is at least three.

19. The filter of claim 11, wherein said data processor includes at least one programmable signal path that is programmed to execute at least one of the M convolutions of said generating step.

20. The filter of claim 11, wherein said data processor includes M fixed signal paths that are each arranged to execute a respective one of the M convolutions of said generating step.

21. A digital filter that has a quantized impulse response and that filters an input data stream D_{in} to thereby generate filtered output signals of a filtered output data stream D_{out} wherein said input data stream D_{in} has data samples that occur at a system rate F_s, the filter comprising;

a converter that converts successive strings of M successive data elements in said input data stream D_{in} to M parallel data elements that respectively occur at a substream rate F_s/M in M data substreams D_{sbstrm}; and

M convolvers which generate, at said substream rate F_s/M, M convolutions of said quantized impulse response with said M data substreams wherein each of said convolvers is arranged to generate a different one of M successive filtered output signals.

22. The filter of claim 21, wherein each of said convolvers includes:

delay structures that delay said M parallel data elements with delays of M/F_s to generate a plurality of delayed data elements;

multipliers that each multiply a selected one of said parallel data elements and said delayed data elements by selected coefficients of said quantized impulse response; and

summers that sum products generated in said multipliers;

wherein said selected parallel data elements and said selected coefficients are chosen in each of said convolvers to generate a respective one of said M filtered output signals.

23. The filter of claim 21, wherein said convolvers include a set of delay structures that delay said M parallel data elements with delays of M/F_S to generate a plurality of delayed data elements and each of said convolvers further includes:

multipliers that each multiply a selected one of said parallel data elements and said delayed data elements by selected coefficients of said quantized impulse response; and

summers that sum products generated in said multipliers;

wherein said selected parallel data element and said selected coefficients are chosen in each of said convolvers to generate a respective one of said M filtered output signals.

24. The filter of claim 21, further including a multiplexer that selects, at said system rate F_S, said M filtered output signals in successive order to thereby form said filtered output data stream D_{out}.

25. The filter of claim 21, wherein M is two.

26. The filter of claim 21, wherein M is at least three.